

## DISCUSSION

CLARENCE G. TOLAND, M. D. (1930 Wilshire Boulevard, Los Angeles).—For a number of years we have been interested in Doctor Askey's work.

We used to be puzzled by a lack of agreement between basal metabolic rates and clinical impressions, and some of the error in interpreting the basal metabolism was due to use of a standard established in a colder climate.

In a subtropical climate, as in Southern California, the basal metabolism is reduced normally; and unless this is recognized, faulty conclusions will be drawn. The discovery that the Aub-Dubois standard for normals predicted values nearly seven points off, when applied to normals here, led us to discard it. We have found the Dreyer standard is much better in predicting basal metabolism in Southern California, and we feel that others checking normal metabolisms here will also find it so. Standards must be chosen according to geographical location, and the only way to know is to find out by determination on normals.

Doctor Askey has done this in Southern California, and I think we can all profit from it. I want to emphasize, too, the need for always stating the standard used when reporting a basal metabolism. Only in this way can we compare rates which have been calculated by different standards.

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H. CLARE SHEPARDSON, M. D. (384 Post Street, San Francisco).—The importance of the data concerning determination of the so-called "zero" point in standards for basal metabolism tests submitted by Doctor Askey varies somewhat, depending on the use to which the test is to be put. As is well known, the minimal amount of energy or number of calories sufficient to support the basic metabolism of a resting individual in the postabsorptive state is known as the basal metabolism. The human machine requires energy for its operation; even during rest, either awake or asleep, vital processes continue.

These require fuel; consequently, the first principle of adequate nutrition is to provide the minimum energy required to support this basic resting metabolism.

Clinically, the basal metabolism of an individual is ascertained either for the purpose of supplying an adequate dietary regimen, or for diagnostic purposes—usually to determine the degree of activity of the thyroid gland; although it should be pointed out, parenthetically, that alterations in the activity of other ductless glands may profoundly influence the metabolism.

Doctor Askey's thesis is concerned only with the second of these purposes. As he has concisely pointed out, there are several sources of error inherent in the method of determining the fundamental metabolism, chief among which (excluding technical errors which for the most part are eliminated as the experience of the technician increases) is the varying emotional state of the patient. As a rule, therefore, small variations should be disregarded, unless—and this is important—they occur on the "minus side." It is almost axiomatic that every factor which adversely influences the test tends also to raise the result. In other words, the lower the rate the nearer it approaches actuality. It, therefore, seems obvious that the clinician should only be interested in variations whose increment is greater than at least 10 or 15 per cent, provided the result is above the normal standard.

On the other hand, much smaller changes found in patients with a lowered basal rate may be quite significant. And it is known that the normal standards vary not only with the sex of the individual, but with his or her race, occupation, and the climate in which the person lives. If these factors tend to lower the "zero" point—and they frequently do—5 or 10 per cent in the general normal population of a given locality, the mistakes that may arise in the interpretation of results become obvious.

As Doctor Askey points out, a basal metabolism test should be accepted only as a laboratory aid, and always as of secondary value to clinical impressions; yet if we are to use the test at all, it should be performed as accurately as possible and the results interpreted as correctly as conditions permit.

Commendation is due Doctor Askey for calling attention to a possible source of significant error in determining the basal metabolic rate, a factor which, with little effort, can be entirely eliminated.

## MOBILE RIGHT COLON: CLINICAL CONSEQUENCES\*

By LEROY BROOKS, M.D.  
San Francisco

DISCUSSION by Loren R. Chandler, M.D., San Francisco; John M. Schmoele, M.D., Los Angeles; William L. Bender, M.D., San Francisco.

THIS report is not concerned with the subject of general visceroptosis, but rather with abnormalities of the position and motility of the ascending colon and the clinical consequences.

## ANATOMIC BASIS

In the development and rotation of the gastrointestinal tract, the cecum and ascending colon are the last to take their final position. Normally, the ascending colon fuses with the posterior abdominal wall and is broadly attached in the right lumbar region. This rotation and fusion process may vary, from failure of rotation, to abnormal mobility of varying degrees. The right colon may possess a true mesentery or the lower half of the ascending colon may be normally fixed and the upper half abnormally mobile—a condition which causes kinking of the bowel—or the upper part with the hepatic flexure may be normally fixed and the lower part mobile, which may lead to axial rotation of from 90 to 120 degrees, with partial obstruction. Along with the lack of normal fixation, abnormal, congenital or developmental bands are prevalent. Although studies on cadavers show that between 20 and 25 per cent of people have some abnormality of fusion of the right colon, we know that only a relatively small number of these develop symptoms. An explanation of this would probably involve the degree of abnormality, the inherited strength or weakness of the tissue fiber, the relative ability of people to stand pain or discomfort, abnormal relation of adjacent organs from lack of uniform ptosis, stress and strain, occupation, proper or improper nourishment, stability or instability of the autonomic nervous system, the upright position and intestinal stasis.

## HOW SYMPTOMS ARE PRODUCED

The writer agrees with Carslaw and Grey that symptoms, when present, are produced by stasis in the right colon, with traction on the narrowly attached mesentery and/or abnormal bands, upsetting the normal physiology of the autonomic nervous system with spasm of the pylorus, ileocecal and other sphincters of Keith, and mechanical and functional obstruction with distention of the involved viscera. An abnormal amount of toxic absorption, as a result of stasis, no doubt also plays a part in the production of general symptoms in some cases.

## ONSET OF SYMPTOMS

The onset of symptoms depends upon the onset of stasis which most commonly occurs about the age of puberty. Symptoms may occur in children or in older people, and are more common in

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females than in males, not infrequently beginning after one or more pregnancies. In children the picture is that of the undernourished, poorly developed, dyspeptic, constipated, colicky child of the linear type which is so well known to all. Constipation is a constant symptom.

At first there is discomfort, usually dyspepsia and loss of weight. Later pain occurs and varies in location, which depends upon the degree of abnormal mobility of the right colon and points of attachment of abnormal bands and the viscera mechanically or functionally involved. While the location of the pain or discomfort varies in different patients, the type and location of the pain is remarkably constant in a given patient, but the time and duration of the pain are most erratic. It may be present for one or several days, then mysteriously disappear for a day or more, only to recur exactly in the same place and to be always of the same type. In fact, a most characteristic feature of the history is this erratic "constant inconstancy" of the symptoms. The symptoms are usually worse toward the end of the day, or following strenuous work or exercise. The patient will often be relieved by cathartics and enemas, or upon assuming the reclining position. There may be, and in the worst cases often is, a history of repeated attacks of diarrhea accompanied by an increased amount of pain, beginning in the region of the cecum, but with absence of the usual amount of mucus common in mucous colitis. Stool examination does not reveal any specific cause of the attacks which are due, we believe, to excessive putrefaction and fermentation with typhlitis and diarrhea.

#### LATER SYMPTOMS AND SIGNS

As time goes on, more weight is lost; the patient becomes nervous, and is often classified as a neurasthenic and drifts from one doctor to another. It is, in general, characteristic of these patients that, after the history and examination have been completed, their conditions do not fit into any of the better-known pathologic entities within the abdomen. Neither do they respond to medical or dietary treatment, as do ulcers, gall-bladder disease, colitis, etc. Not infrequently they lose their appendix, gall-bladder, or ovary, as the result of an honest attempt to give relief. Finally they develop colitis, gall-bladder disease, duodenitis, ulcers, etc., and the picture becomes complicated and the original symptoms are overshadowed by the more constant recognizable ones of the organic changes. While there is only a small percentage of people with abnormal mobility of the right colon who have symptoms, no doubt there are many who go unrecognized or upon whom an erroneous diagnosis of chronic appendicitis, neurasthenia, etc., is made.

The gastric symptoms predominate when the hepatic flexure is not fixed, and the pyloric end of the stomach and duodenum are dragged downward and the load of the heavy right colon is partially borne by the tissues toward the cardiac end of the stomach. This type may have pain in both the right and the left upper quadrant, indigestion, loss of weight, abundance of gaseous

eructations—sometimes to the point of social embarrassment—and nervousness is a common feature.

When abnormal congenital bands are attached to the colon and gall-bladder, one is apt to elicit symptoms referable to this region. Traction through the superior mesentery and right colon arteries may lead to chronic obstruction of the duodenum, attacks of vomiting, headaches, and acute upper abdominal pain (acute duodenitis) lasting from three to five days, often requiring rest in bed and sometimes morphin for relief. There is no muscle-guarding as in gall-bladder disease. In between attacks, the symptoms are those of chronic duodenal ilius. The symptoms differ from ulcers of the stomach or duodenum or gall-bladder disease in the erratic nature and lack of relief by diet and medical regimen. Patients may or may not be relieved by taking food, and usually have given up dieting, as they feel as well when eating one thing as another.

Occasionally, pain in the right lumbar region is a prominent feature. This may vary from discomfort to Dietl's crisis, with the well-known symptoms, and is due to a reno-colic band connecting the ptosed ascending colon with the anterior surface of the kidney, dragging the latter downward. Fixation of such kidneys offers only temporary relief, since the heavy right colon will again drag the kidney downward.

#### RIGHT LOWER QUADRANT TYPE

The right lower quadrant type is the most common and is met in patients who have more or less normal fusion of the hepatic flexure of the colon, but with lack of fusion of the cecum and a varying amount of the ascending colon. They have right lower quadrant pain, constipation—usually indigestion milder than in the incidences with greater lack of fusion, as cited above. The right lower quadrant pain is dragging or aching in type from overdistention of the cecum, or traction of congenital bands, is not present every day, worse on exercise, and when the constipation is worse, relieved by cathartics, enemata, and rest in bed. In some cases there is superimposed upon this dull right lower quadrant pain, a colicky type of pain which is usually due to a large-mouthed appendix trying to empty itself, or one that contains fecoliths. It is not uncommon for this type to have an acute attack simulating in some respects an attack of acute appendicitis, but differing from acute appendicitis in that the pain usually begins and stays in the right lower quadrant of the abdomen. There may be—but usually there is not—nausea or vomiting. There is lack of elevation of the temperature, lack of an increase in the leukocyte count as seen in acute appendicitis, and there is generally no actual rigidity, but extreme tenderness upon pressure in the right lower quadrant of the abdomen. Operation upon such patients during such an attack, which is often the procedure of wisdom, will reveal a heavy, thickened, grayish, edematous cecum, filled with liquid and gas and with enlarged lymph glands in its mesentery, and an insignificant appendix, the removal

TABLE 1.—*Types*

Cecal .....	51	(3 duodenojejunosomy) (General plastic)
Gastric .....	1	
Duodenum or renal .....	16	
General ptosis .....	1	
Total .....	69	

of which will not prevent the patients continuing to have their dull right lower quadrant pain, nor their occasional attack, similar to the one for which they were operated upon.

Physical examination of these patients does not furnish diagnostic aid comparable to that furnished by the history, except to help rule out other better known lesions. The types who have lack of fixation of the hepatic flexure are of the linear type, with narrow, flat, long chest, a small upper and large lower abdomen, with a straight lumbar spine. Those interested in this body type in connection with abnormal mobility of the right colon, are referred to publications by Longyear, Coffey, Goathwaite, and others. Contrary to general opinion, the right lower quadrant type may be met in patients of normal build or of the lateral type.

#### BILIARY TYPE

In the biliary type, discomfort is usually elicited by pressure over the dilated duodenum. During the examination the duodenum can often be emptied of its liquid and gas contents by pressure of the hand over this viscus, with the patient in the knee-chest position, and the patient has often learned that this position gives relief.

#### RENAL TYPE

In the renal type the movable kidney can be palpated. The right lower quadrant type complains when pressure is made over that quadrant, and gaseous distention of the cecum is excessive and one can sometimes hear the contents splash or gurgle. The cecum can often be outlined by percussion.

#### DIAGNOSIS

The x-ray is a valuable aid in determining the abnormal mobility of the right colon, dilatation of the duodenum, spasm of the pylorus and stasis in the cecum, and in helping to rule out other pathology.

The differential diagnosis is made by a process of elimination of the other clinical entities with simulating symptoms. A detailed accurate history properly interpreted is compulsory before arriving at a tentative diagnosis.

Since many of these people are nervous it becomes necessary to determine whether the nervous

TABLE 3.—*Results*

Relieved of symptoms ....	63	91.3%
Improved .....	4	5.8%
Failure .....	2	2.9%

symptoms are primary or secondary to the loss of weight and run-down condition. This is often difficult and at times impossible. But if the patient had indigestion, loss of weight, pain in the abdomen, constipation, etc., before the onset of insomnia and other nervous symptoms, and particularly if she is annoyed or aggravated by her ill health instead of telling her story with apparent pleasure, the chances are her abdominal trouble is primarily organic due to traction on the mesentery of heavy proximal colon, with upset of the autonomic balance and mental outlook.

It should ever be kept in mind that since an abnormally mobile right colon is so often present without producing any symptoms, it should be incriminated only after all the other better-known pathologic entities have been ruled out by the history, examination, and a thorough exploration of the abdomen at the time of the operation.

#### PROBABLE EXPLANATION OF SYMPTOMS

The following facts are significant in connection with the hypothesis that the symptoms are caused by traction on the mesentery or developmental bands attached to the parietal peritoneum or adjacent organs, and mechanical stimulation of the sympathetic nerves:

The gastro-intestinal tract has a dual nerve supply with delicately balanced, opposing functions. On the one hand is the sympathetic proper, which comes from the thoracic and upper lumbar cord, and on the other the parasympathetic which is supplied through the vagus and the sacral autonomies. Stimulation of the sympathetic results in a relaxation of the muscles of the gastro-intestinal tract and tends to inhibit peristalsis, but tightens the sphincters. The sphincter at the cardia, the pyloric sphincter, the ileocecal sphincter and probably the other sphincters of Keith's, are caused to contract by stimulation of the sympathetic nerves.

Stimulation of the parasympathetic causes diametrically the opposite effect from that of stimulation of the sympathetic. It is, however, well known among research workers and clinical surgeons that tension on the mesentery or the parietal peritoneum results in a response on the part of the sympathetic nervous system, and not in a response on the part of the parasympathetic.

TABLE 2.—*Sex and Age Incidence*

	Under 10 Yrs.	10-19 Yrs.	20-29 Yrs.	30-39 Yrs.	40-49 Yrs.	Total
Female .....	2	21	20	8	2	53
Male .....	3	4	6	3	..	16
Total .....	5	25	26	11	2	69
Percentage .....	7.3%	36.2%	37.7%	15.9%	2.9%	100%

During operations under local anesthesia (not spinal) it can often easily be observed that the peristalsis of the intestines is very active. Slight tension on the mesentery or the parietal peritoneum will cause these intestinal movements to instantly cease and the bowel will, within a few seconds, be seen to dilate to twice or three times its original size. This is evidence of a sympathetic response or reflex to the tension on the mesentery, and the amount of tension necessary to demonstrate the above can easily be furnished by the weight of the ptosed, heavy, thickened, liquid-filled, swinging right colon. At operation on one of these patients, one is struck by the weight of the cecum and the first part of the ascending colon when it is lifted out of the abdominal cavity. This traction would not only cause spasm of the pylorus, hyperchlorhydria, and indigestion, but would interfere with peristalsis and favor stasis and, when long-continued, would establish a vicious circle and have a profound effect upon the individual's nervous system and general well-being.

It will be remembered that practically all our water is absorbed from the right half of the colon, and also that normally there occurs antiperistalsis which begins about the middle of the transverse colon and progresses backward to the cecum, a mechanism for retention of the heavy liquid feces until the water has been absorbed.

With an abnormally mobile cecum, with a narrowly attached mesentery or congenital bands attached to the viscera or to the parietal peritoneum, this load must be carried by such structures while the patient is in an upright position. The fact that many of these people are completely relieved of their symptoms during pregnancy, due to the bowel resting upon the plateau of the uterus as it rises out of the pelvis, and the load is no longer carried by tension on the mesentery, is a common observation, worthy of note. We have all seen at operations, many times, the cecum lying upon the bony floor of the pelvis, where ptosis of proximal colon is marked, and the patient having no symptoms relative thereto, because the load rests upon the bony pelvis and is not suspended by the mesentery.

Kantor and his coworkers at the Presbyterian Hospital in New York reviewed the record of 959 gastro-intestinal cases. They discovered cecal stasis in 27 per cent. In the cases of stasis they found that the symptoms of headaches, vomiting, right lower quadrant pain and right lower quadrant tenderness were from one and one-half to over two times as high in the low ceca group as in the normal, or high ceca group. Hirsch's work in 1924 on the cecocolic sphincter is significant, but time is not available to go into details.

Operation for the removal of the appendix following a diagnosis of chronic appendicitis does not give satisfactory results.

A fair average of the reports from our leading clinics would place this operation in the best hands, as a failure in about 50 per cent of the cases. It is not the intent here to carry the impression that all of these failures are due to an abnormally mobile cecum and ascending colon, but there is no doubt that many of them can be explained upon

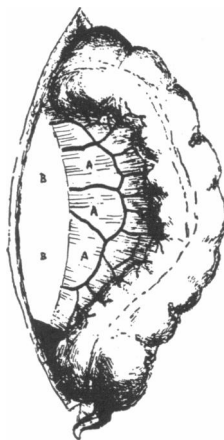


Fig. 1

Fig. 1.—The abnormally mobile ascending colon and cecum have been lifted out of the abdomen, revealing the true mesentery (A) with its arches of blood vessels and the opaque, nonvascular false mesentery (B). (After Waugh.)

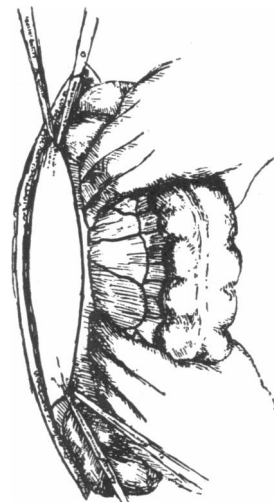


Fig. 2

Fig. 2.—Showing the line of incision along the junction of the true and false mesenteries. (After Waugh.)

this basis. Finally, the simple colepexy, according to the method of the English surgeon, Waugh, relieves tension on the mesentery and cures a sufficient number of these troublesome patients to warrant its further use until something better is offered.

#### TECHNIQUE OF OPERATION

Upon opening the abdomen an exploration is made for the more usually recognized pathology. A thorough search for the prevalent abnormal congenital bands is often awarded by positive findings. The most common band is one that extends from the right side of the omentum attached to the ascending colon and to the lumbar region. Other abdominal bands will not be detailed in this paper for lack of space. Any congenital band is dealt with according to indications.

Upon picking up the cecum and ascending colon, one finds that it comes outside of the abdomen. Inspection of the outer side of its true mesentery will reveal a fascial extension drawn out from the lumbar region, and has been called a pseudomesentery. This fascial sheet varies in extent with the amount of drag on the lumbar fascia, and in length and thickness with the degree of mobility of the right colon and the age of the patient, respectively. This statement holds, however, only when there is some degree of fixation of the colon at the hepatic flexure.

As illustrated in Figures 1 and 2, this fascia is separated from the true mesentery, and after a space has been made in the lumbar region for the ascending colon the edge of the fascia is sutured to the anterior longitudinal line of the ascending colon. Small and necessary variations in the exact technique will vary in individual cases and with the mechanical acumen of the operator.

#### RESULTS RECORDED IN THE LITERATURE

In 1920 Waugh reported in detail his results in 180 cases of colepexy, according to the method

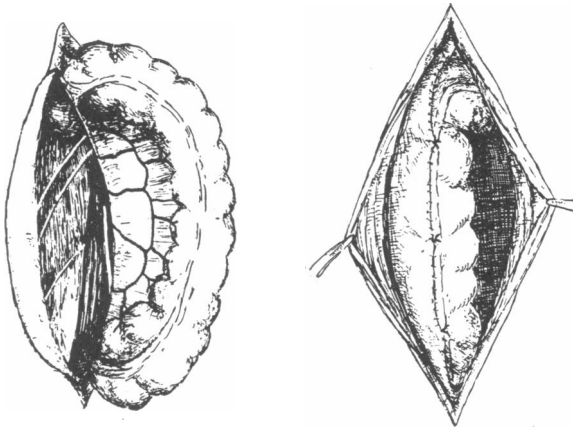


Fig. 3

Fig. 4

Fig. 3.—The false mesentery has been turned outwards, exposing above the lower pole of the kidney, on the inner side the ureter, and, crossing the quadratus lumborum muscle, the iliohypogastric, ilioinguinal, and external cutaneous nerves. (After Waugh.)

Fig. 4.—The ascending colon and cecum having been rolled into the extraperitoneal space, the cut edge of the false mesentery has been stitched to the anterior longitudinal band. (After Waugh.)

just shown. It was at this time that we first became interested in this subject, and apparently many others were stimulated by the same article, as recently there have occurred in the literature several reports of work which was started about that date. Altogether, to date, Waugh has reported 518 cases with cures between 75 and 80 per cent, improvement in about 12 per cent, and failures in from 8 to 10 per cent.

Carslaw of Glasgow states that he received his stimulus from Waugh's paper and undertook to operate upon any medical failures suffering from ptosis, as a piece of research work. Over a period of seven years he operated upon 242 cases according to the method of Waugh. He reports that he has followed up 239 of these, and either saw them himself or communicated with their family physician, who saw them. He reports a cure in 70.7 per cent of the cases, much improvement in 18.4 per cent, and failures in 10.9 per cent. Among these were many who were suffering from general visceroptosis, and upon whom he operated, and it was in this group that he met with the greatest percentage of failures. Ten of his patients had previously been appendectomized without relief, and were completely cured by the colepepy. His article amounts to a monograph on the subject, and is very well done.

McConnell and Hardeman of Dublin, Ainsworth of Waco, Texas, Quain of Bismark, North Dakota, and others, have reported results similar to the results of Waugh and Carslaw. Houston of Augusta, Georgia, an internist, has, since 1920, had 145 colepexies performed; and while he does not give a percentage of cures or failures in figures, he states that the results are far more satisfactory than the results following plastic operations in gynecology. This certainly coincides with my experience. He further states that it makes it possible for him as a medical man to keep well, and at work after operation, patients who, before operation, would have periodic breakdowns and

have to discontinue their occupation for a rest cure. Twenty of his patients had previously been appendectomized without relief, and were relieved by colon fixation.

#### AUTHOR'S EXPERIENCE

Of the colon fixations which we have done in the past fourteen years, we have been able to follow sixty-nine patients. A duodenojejunoscopy and fixation were done in three because of the enormously dilated duodenum. A general plastic, consisting of shortening of the gastrohepatic ligament, fixation of the transverse colon through the omentum to the anterior abdominal wall and a right colon fixation was done in one patient with general visceroptosis, who had been bed-ridden for fifteen months and who has been well now for seven and one-half years, working steadily as a jeweler. Out of the sixty-nine cases, we can report sixty-three who are relieved of the abdominal symptoms of which they complained; four are very much improved and two are failures. The patients placed in the improved group have all been patients who had a very long transverse and descending colon and, while they are relieved of the dragging type of pain in the right side of their abdomen, they still have, at times, abdominal pains which are relieved by enemas. One of the failures was a young girl about seventeen years of age, operated upon for acute appendicitis and who had a gangrenous appendix, and because of continued right-sided chronic aching type of pain, two years later she was reoperated upon and a colon fixation done. She is still constipated, has indigestion, headaches, is of a very nervous type in spite of the fact that she is quite plump, she still complains of a great deal of right-sided abdominal pain. Urological search and other examinations have failed to find the cause of her pain.

Our other failure occurred in a woman about forty-five years of age, who had previously had an ovariectomy, an appendectomy and a cholecystectomy at different operations, and many operations for fissure of the anus. She was of the biliary type, and has marked colitis; and while her medical man maintains that he thinks she has definitely been benefited, she still has many complaints when she talks to me.

We have been mindful all the while that this is a subject upon which one could easily go astray because there are many patients who have abnormal mobility of the right colon who do not have any symptoms whatsoever as a result thereof, and in operating, even though an abnormally mobile cecum and ascending colon were present, and at the time of the operation other pathology found which would explain the patient's symptoms, the colepepy has not been done. There have been several cases with mobile ascending colon in whom a large-mouthed, kinked appendix, containing enteroliths, have been removed and who have come back complaining of a dull aching pain in the right side, and whom we believe would have been relieved had a colepepy been done, although at the time of the operation it was thought that the condition of the appendix was sufficient to explain the symptoms.

The operation is simple, easy to perform, adds only about ten minutes to the operating time, is not destructive—on the contrary, is constructive and is based, I believe, upon sound physiologic principles. It does not increase the number of operations, as these patients are recruited from those (medical failures) whose symptoms cause them to be opened for chronic appendicitis, questionable gall-bladder, ulcers, exploratory, etc.

#### IN CONCLUSION

The subject is too big to try to cover in a short paper, but, in conclusion, we would like to say, with Houston, that we believe if those who are interested will refer to Waugh's original essay on his 180 cases in the *British Journal of Surgery*, 1920; to McConnell and Hardeman's essay in the same journal, 1924; and again in the same journal of 1928, to Carslaw's long article reporting 242 cases of colepepy as studied in Glasgow; and further if he will familiarize himself with the mass of literature on the subject in the light of physiology, he will inevitably come to the conclusion that some of the most troublesome patients fall in this group, and that many of them can be cured by fixing the ascending colon in its normal position.

2000 Van Ness Avenue.

#### DISCUSSION

LOREN R. CHANDLER, M. D. (Stanford University Hospital, San Francisco).—Doctor Brooks has reviewed excellently the clinical aspects of mobile cecum, and his experience with the Waugh operation shows a high percentage of cures. However, I disagree sharply with him on his interpretation of how symptoms are produced, and upon the treatment indicated to relieve these patients of their complaints.

The abnormal bands referred to undoubtedly are congenital. They are present in a large number of infants and new-born, and have such a regularity in their position that it seems unlikely that they could be produced so exactly and frequently by intra-abdominal inflammation. The bands are always attached to the anterior longitudinal band of the ascending colon, a short distance below the hepatic flexure, and extend laterally and upward to the parietal peritoneum below the lower pole of the right kidney. They are lateral and anterior to the true peritoneal mesentery of the colon. These bands also may extend from these two limits to other points, involving the duodenum and gall-bladder and, in some cases, the visceral attachment of the band extends cephalad onto the terminal portion of the small bowel. But no matter what else is involved, the attachment to the colon is to the anterior longitudinal band. Inasmuch as the parietal attachment is above and behind the visceral attachment, these bands do not pull on the mesentery of the colon or small bowel, but tend to pull the point of attachment on the colon backward, and rotate it laterally. This leaves the cecum and that portion of the ascending colon proximal to the point of fixation unusually free and mobile.

Many persons possess these bands, but do not have symptoms. Careful observation reveals the fact that when these bands are short the ascending colon is partially obstructed and rotated laterally at the point of attachment of the band. Patients with this condition have the symptoms so well described by Doctor Brooks and others. When these bands are long and there is no obstruction or rotation (and this condition is found a great many times), the patients do not have abdominal symptoms. The partial obstruction produces stasis and must interfere with normal physiology; but I have never been convinced that "traction on the narrowly attached mesentery and/or abnormal bands upsets the normal physiology of the autonomic nervous system"—in such a way as to cause this type of intestinal complaint.

Inasmuch as the symptoms are due to obstruction, the treatment is to relieve the obstruction. This is done by sectioning the abnormal band at or near its attachment to the parietal peritoneum. This relieves the obstruction promptly and, I believe, permanently. The Waugh operation separates the attachments of the band, which I believe produces the cure, but goes further in that the abnormally mobile cecum and lower part, of the ascending colon are sutured to the fascia of the posterior abdominal wall. This part of the Waugh operation is unnecessary to effect a cure.

Although I am not aware of any definite symptom-complex or syndrome in these patients, I agree with Doctor Brooks that this condition is a very definite entity which can be cured by operation.

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JOHN M. SCHMOELE, M. D. (1930 Wilshire Boulevard, Los Angeles).—Doctor Brooks's paper deserves intensive study by all clinicians and surgeons. The problem of the mobile right colon, associated with congenital bands of various types and anatomical positions, is still somewhat of an enigma to most of us; yet, after studying the observations of the author, Waugh, Rea Smith, McConnell, Carslaw, and others, one must feel that this solution is at least in sight.

I have had the opportunity to be associated during the past decade with the late Dr. Rea Smith, who carried on a great amount of practical work in this field, paying especial attention to the relationship between chronic arthritis and toxic intestinal absorption, resulting from congenital malposition and bands blocking the right colon. A right-sided colectomy was performed with the Lane short circuit in the beginning. This series included over one hundred cases. The Waugh operation was done later, but during the past seven years the opaque avascular false mesentery or band was simply excised and the bowel supported externally by properly fitting abdominal supports.

The chemistry and physiology of the right bowel following any type of reconstructive surgery must be considered if relief of symptoms are to be expected with relative rapidity. The intestinal flora should be studied, peristalsis stimulated, and rigid attention paid to diet.

Doctor Brooks, for want of space, has not stressed sufficiently the importance of detailed roentgenologic studies in making the diagnosis of abnormalities of the right colon. (I refer to a technique developed by Taylor. (*Journal of Bone and Joint Surgery*, Vol. 10, No. 1, pp. 62-68, January, 1928.)

Our clinical results have been tabulated primarily on the basis of symptomatic relief of chronic arthritis rather than the relief of gastro-intestinal symptoms, which we have considered secondarily. It suffices at this time to say that our results have been clinically satisfactory, although our experience with the Waugh operation does not warrant an authoritative criticism.

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WILLIAM L. BENDER, M. D. (384 Post Street, San Francisco).—Mechanical abnormalities of the colon are frequent, in the distal as well as the proximal portion. For some time I have been interested in the symptoms due to unusually long or redundant sigmoid colon. Opinions differ as to the acquired or congenital status of this condition. Therapeutically, one should bear in mind that obstruction or stagnation distally may influence the result of operation to relieve the condition described by Doctor Brooks, through back pressure. Since developmental anomalies tend to be multiple, the gastro-intestinal examination should be cognizant of others, such as diverticula, including Meckel's, and diaphragmatic abnormalities. On the whole, the reported results of colepepy are good, and unquestionably the procedure deserves the emphasis Doctor Brooks places on it.

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DOCTOR BROOKS (Closing).—I wish to thank Doctors Chandler, Schmoele, and Bender for their discussion of this paper. I am in entire agreement with Doctor Chandler in reference to the band that he describes as being congenital. He is also correct in his description of its attachment or probable attachment. It is accepted that this band represents a lateral extension of the omentum. In fact, its blood supply is continuous with that of the

omentum, and, so far as I know, no one who is informed any longer contends that it is of inflammatory origin. Moreover, the band often only extends to the ascending colon and does not cross this portion of the gut, and is not necessarily attached in the lumbar region. The band may or may not be responsible for partial obstruction, and may or may not, therefore, cause any symptoms.

I do wish, however, to take issue with Doctor Chandler when he infers that this particular band is necessary for the production of the chain of symptoms outlined in this paper, for the excellent reason that the majority of the patients under discussion here, and in the experience of others, did not have this particular band, and did have the symptoms outlined and were relieved by operation. I am convinced that the right lower quadrant discomfort or right lower quadrant pain is due to a distention of the cecum, whether the distention is caused by partial mechanical obstruction or by functional stasis without mechanical obstruction, except that, clinically, with mechanical obstruction the symptoms are apt to be more constant than the variable symptoms in the cases with functional stasis.

I did not state in this paper that this congenital band pulled on the mesentery. The fact is that some congenital bands that take part in disturbing the autonomic nervous system do so by pulling on their attachment to the parietal peritoneum. A slight pull on the parietal peritoneum through a congenital band, or a pull on the mesentery by the weight of a filled cecum, does definitely disturb the sympathetic part of the autonomic nervous system. This fact can be definitely and easily demonstrated at operation under local anesthesia, and confirmed by irrefutable evidence presented in all standard textbooks of physiology. This paper was meant primarily to deal with the chain of symptoms or clinical entity based, in my opinion, upon morbid or pathologic physiology and not so much as in the usual surgical lesions on deadhouse pathology.

I believe there is a definite relationship between stagnation of the cecum with absorption of bacteria with increased virulence and progressive arthritis in people with advancing years. I am indebted to Doctor Schmoele for bringing out this point. Time and space did not permit of the discussion of this aspect of the subject at this time. However, it is propitious to say here that if there is a definite relationship between cecal stasis and arthritis, it should be important to relieve the stasis of the cecum by whatever means necessary and prevent or slow down the development of the multiple arthritis.

Likewise, Doctor Bender brings up an important point relative to congenital abnormalities often being multiple, all of which may have a definite significance in any given case; but a general discussion of these complications to right mobile colon could not be crowded into the time allotted to this paper.

## CONGENITAL OCCLUSION OF THE SMALL INTESTINE\*

By JOHN HOMER WOOLSEY, M.D.  
Woodland

DISCUSSION by E. Eric Larson, M.D., Los Angeles;  
William J. Norris, M.D., Los Angeles; Edwin M. Taylor,  
M.D., Oakland.

**C**ONGENITAL occlusion of the small intestine occurs from both intrinsic and extrinsic causes; in single and multiple forms; and chiefly in the duodenal and ileal regions. Its frequency merits attention. It can be diagnosed and is amenable to surgical correction. Newer ideas of stool examination and proved methods of roentgen-ray study aid tremendously in its recognition, location,

and degree of occlusion. Proved and clever methods in technique aid greatly in the operative treatment.

### ETIOLOGY

One would think that occlusion would occur at the site of junction of the embryologic portions of the primary gastro-intestinal tract, such as the junction of the fore- and midgut, and the mid- and hind-gut; but this is not so. Also the often-quoted remark of Bland Sutton of 1889, "always in the situation of embryological events," is not strictly true. The occlusion occurs from both intrinsic and extrinsic causes, and these causes play a part in the location of the occlusion.

*Intrinsic Causes.*—The intrinsic, as recognized today, was described in 1900 by Tandler<sup>1</sup> and more completely in 1907 by Forsner,<sup>2</sup> a Swedish anatomist. They observed that up to the fifth week of fetal life the small intestine presents a well-defined lumen lined with epithelium; that these epithelial cells rapidly proliferate and obliterate the lumen by epithelial concrescences. By the twelfth week of fetal life these concrescences break down into a liquid state, forming vacuoles which in turn coalesce and reestablish the lumen. If, on the contrary, some interference in development occurs during this period, an atresia or a stenosis may result. Forsner divides the mal-developments into three groups, namely, Group 1, in which a small diaphragm of epithelial cells, either complete or incomplete, occurs across the lumen, thereby giving a complete or partial occlusion; Group 2, in which there are two blind ends of intestine joined by an intervening cord, known as an atresia; and Group 3, in which there are two blind ends of the intestine absolutely unconnected—also an atresia.

*Extrinsic Causes.*—The extrinsic causes are those due to a sclerosis of the blood vessels to a local area with a resultant lack of development because of insufficient blood supply; to mal-development of the vitello-intestinal duct, in that if atrophy of this embryologic tract goes on to excess it absorbs some of the primitive bowel, giving either a stenosis or an atresia; and to faulty rotation of the intestine with compression of the blood supply and a secondary loss of development.

Faulty rotation is considered to be a cause of abnormal conditions in the lower ileum. Faulty rotation may present a disturbance at many levels due to compression of a local blood supply from a constricting fibrous band, from overfusion of a mesentery, or from a volvulus. The normal embryologic process of development and rotation of the small intestine is somewhat as follows: After the fifth week of fetal life, the liver and other visceral organs grow faster than the abdominal cavity, and the midgut is forced into the base of the umbilical cord. By the tenth week the midgut begins its return, with the duodenal, jejunal and upper ileal segments being first. As they return they pass in sequence from the right to the left behind the superior mesenteric artery. This leaves, as the last loop to return, the lower ileum, cecum,

\* From the Surgical Service of the Woodland Clinic.

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